But in merely making incidental memoranda of the every-day experiences of life in his northern home, Mr. Smith has mentioned not a few interesting things; and for these one soon begins to be grateful in reading a volume that is otherwise none too lively. He tells us, for example, how a heron was suspected of stealing ducklings, was watched, and finally caught in the act of devouring one of the birds—which seems a singular occurrence. On the other hand, the appearance of a bat in January, when the West Highlands happen to be visited by a spell of mild weather, is by no means the rare phenomenon he supposes it to be. There are some interesting remarks on the incubation of the cuckoo's egg (pp. 13 and 16) which seem to suggest a need for further inquiry. But we cannot say that we place implicit faith in Mr. Anderson Smith as an observer. His story of how, on one occasion, in passing through a wood, he startled a number of fallow-deer and roebuck may be forgiven on account of the darkness prevailing at the time: we should prefer to wait for some daylight notes before believing that the fallow-deer and the roe have agreed to lay aside their long-standing and mutual antipathy. "The pheasant is an unwieldy bird and of no great power of flight." Did the writer of that sentence ever try to "stop" a rocketer well on the wing and coming down wind; and what was the expression of his face when he wheeled round to find the "unwieldy" bird already disappearing into the next parish? Mr. Smith in this volume revives a controversy in which, as it appears, he has been engaged before, with regard to the lower animals committing suicide; and remarks that it may be assumed they know what death is from the fact that many of them can simulate it with marvellous accuracy. It is no doubt true that the young of certain animals, when confronted with danger, will suddenly become motionless, and remain so until the danger is removed—just as it is a common trick among street arabs for a small boy, when pursued by a bigger boy, to throw himself down in the roadway and lie perfectly still, prepared for the worst. But to assume that the young curlew or the young rat that suddenly stiffens itself and shuts its eyes is aware that it is simulating death, or has any understanding of such a state, is a far jump. Mr. Smith cites the case of a terrier belonging to a friend of his which, having the distemper, deliberately went off and drowned itself. Clearly the verdict here must be temporary insanity; the dog did not know what it was doing. The chief reason for concluding that the lower animals are not aware that they possess the liberty of suicide is that so few of them (or none of them) take advantage of it; if they did know, the overworked cart-horse, the mangy cur, the long-enduring donkey, would forthwith knock their heads against the nearest wall—unless, indeed, it is to be supposed that these animals are so highly intelligent as to have heard of the significant French proverb: "Quand on est mort, c'est pour longtemps." But this question of suicide among animals has always been a stumbling-block. Prof. Edward Forbes accused a whole tribe of star-fish of having a suicidal instinct on no better grounds than that they, on being brought into the air, or put in fresh water, went to bits. He even describes one of them as rejoicing in its power of eluding scientific scrutiny:—"I saw its limbs escaping through every mesh of the dredge. In my despair I seized the largest piece, and brought up the extremity of an arm with its terminal eye, the spinous eyelid of which opened and closed with something exceedingly like a wink of derision." After this we shall not be surprised to hear of a body of scientific experts meeting to consider the question of suicide among animals—with Mark Twain as President of the Committee.

"Loch Creran" is not a vivacious book; but it is unpretentious; and the author, in a rambling and hap-hazard fashion, contrives to give us some idea of his surroundings and pursuits. Indeed, the dweller in towns, who has the patience to follow this somewhat prolix writer, will probably part company with him with no slight feeling of envy.

OUR BOOK SHELF

The Encyclopædic Dictionary. Vol. VI. Part I. (London: Cassell and Co., 1887.)

THE work to which this volume belongs is much more than a mere dictionary in the ordinary sense. It includes the description of things as well as of words, special attention being given to objects and processes indicated by scientific and technical terms. The information offered is never, of course, exhaustive, but it is sufficient for the purposes the compilers have had in view, and generally it has the merit of being clear, concise, and, as far as it goes, accurate. As a dictionary the work deserves high praise. It contains all the English as well as all the Scotch words now in use, with their significations re-investigated, re-classified, and re-illustrated by examples. A large number of obsolete words have also been introduced. The etymology is inclosed within brackets immediately following each word; and the pronunciation is indicated by diacritical marks, a key to which is given at the foot of the several pages. The present volume includes all words from "quoi" to "shipp," and, so far as we have been able to test it, we have found it lucidly arranged and thoroughly trustworthy.

Descriptive Catalogue of the General Collection of Minerals in the Australian Museum. By A. Felix Ratte. Printed by order of the Trustees. (Sydney: Thomas Richards.)

THIS Catalogue has been carefully compiled, and no doubt it has already been of considerable service to persons making use of the Australian Museum. For the classification of silicates the compiler has taken as a guide Dana's "System of Mineralogy"; for the classification of metallic minerals, Roscoe's "Chemistry." But these authors' systems have not been entirely followed, especially where rare mineral products are concerned. The notes, although generally brief, are adequate, and there is a valuable appendix on gems and ornamental specimens.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

West Indian Meteorological Confederation

IN the leading article in NATURE, vol. xxxv. p. 241, remarks were made respecting the advantages which would accrue to the West Indian Islands, and to the Meteorological Council of the

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Royal Society, if those islands were confederated for meteorological purposes.

The writer was apparently unaware that in the year 1879 those islands agreed to confederation. It was not restricted to the British colonies—Guadaloupe, for instance, passed a vote of credit through its chamber before the decision of the British Meteorological Council was received—but all the work broke down when the Meteorological Council insisted upon Antigua as the central station.

It is unnecessary to say that unmitigated failure was the result.

The advantages to the United States of any West Indian system, however poor, are palpable to the lowest stratum of scientific intelligence; yet we find that Congress disestablished the whole of their West Indian stations without the slightest reason, as far as I have been able to discover. But the words of the Chief Signal Officer have a thousand times the weight of mine, and I quote them accordingly:—

"Among the objects for which appropriations were refused were 'foreign reports.' A request was made for 4000 dollars to pay for these warnings of tropical hurricanes, which, last year, were instrumental in saving millions of dollars of property. Two storms of great fury swept up from the Gulf, one in September and one in October. Warnings of the coming of these storms were given from the West India stations, so that the indications officer on duty in each month was able to give at least two days' notice of the coming of the storm to every port in the Gulf and on the Atlantic coast. The result was an immense saving of valuable property and of human life. The statistics were gathered as fully as possible from all the stations passed over by the cyclones, and the names of the vessels, their value, and the value of their cargoes, remaining in port in obedience to the storm warnings of this service, were ascertained. The reports were not wholly satisfactory, because accurate information could not be obtained from the largest places of the country, such as New York, Philadelphia, Baltimore, and Boston. These cities lie at the head of large harbours that have safe anchorages near their openings, and vessels delayed by a storm almost invariably go down the harbour to there await its conclusion. But, without these great ports, it was ascertained that 6,460,586 dollars of property remained safe in harbour during the September cyclone, and 6,051,393 dollars in October. The failure to appropriate the 4000 dollars asked for for the current fiscal year has reduced the warnings received from the West Indies, and made it less possible to predict with certainty the approach of tropical hurricanes." (Report for 1883, p, 4.)

The anticipations of the Chief Signal Officer have been fully confirmed.

In the face of such opposition I would ask what is the use of proposing schemes of confederation requiring the support of the authorities? There is no doubt that if meteorological confederation is to obtain in the West Indies, it must be done among the British colonies themselves; but who will come forward to undertake such a task? Should anyone attempt it, he will at least have the support of Jamaica.

MAXWELL HALL,
February 15 Jamaica Government Meteorologist

Units of Weight, Mass, and Force

Your reviewer, of the well-known initials "P. G. T.," has taken exception to some of the terminology employed by Mr. Anderson in his book "On the Conversion of Heat into Work," particularly to the expressions of "pounds on the square inch" and "tons on the square inch," which he says would define a superficial density if used in their proper sense; and it is this opinion I wish, with your permission, to dispute, as I think "P. G. T." and mathematicians generally, are at present in this endeavour to avoid one ambiguity in dynamical language only creating greater confusion.

I presume that "P. G. T." would have been satisfied with the above expressions provided the word "weight" had been introduced somewhere; but let us examine carefully what is implied by "weight" as used in ordinary language.

Turning to the chapter on elementary dynamical principles in Maxwell's "Theory of Heat," we find that "the word *weight* must be understood to mean the *quantity of the thing as determined by the process of weighing against standard weights.*" And again:—"In a rude age, before the invention of means for overcoming friction, the weight of bodies formed the chief obstacle to setting them in motion. It was only after some progress had been made in the art of throwing missiles, and in the use of wheel-carriages and floating vessels, that men's minds became practically impressed with the idea of mass as distinguished from weight."

The language we employ, including the use of the ambiguous word "weight," was formed in this rude age before the discovery of true dynamical principles and before the theory of gravitation, and now, in order to avoid ambiguity, the mathematician uses, *wherever it is possible*, the word "mass" for greater precision, where an ordinary person would use the word weight.

But unfortunately for his principle the rules of language do not permit him to be consistent, and he is compelled to speak of "*weights* and measures" and of "bodies *weighing* so many pounds or tons" instead of "bodies *massing* so many pounds," or "*masses* and measures," which might be mistaken for a political phrase.

The word "weight" will, then, be found to be used in ordinary language in most cases in the same sense as the word "mass," introduced with laudable intention by the mathematicians to avoid confusion; but unfortunately some mathematicians introduce greater confusion than they remove by appropriating the word "weight" to the subsidiary sense of the word, undistinguishable by those ignorant of dynamics, namely, the force with which the earth attracts the weight.

Thus we find in ordinary treatises on dynamics, after an effort at the definition of the mass, the weight of a body defined as "the force with which it is attracted by the earth."

As Maxwell says, "The only occasions in common life in which it is required to estimate weight considered as a force is when we have to determine the strength required to lift or carry things, or when we have to make a structure strong enough to support their weight." Herein is comprised in general terms the whole province of the theory of engineering, and consequently the engineer always employs the gravitational measure of forces.

The force with which the earth attracts the standard weight is taken as the gravitation unit of force; and for brevity the force with which the earth attracts a pound weight (the mathematician would say a pound mass) is called the force of a pound, abbreviated again to "a pound." Hence we have steam pressures, gunpowder pressures, moduli of elasticity, tenacities, &c., as well as the expressions objected to by "P. G. T." in Mr. Anderson's book, expressed in pounds or tons on the square inch, without creating any confusion in the mind of the practical man; and we find the words "pound" or "ton" used side by side, now in the sense of weight or mass, and now in the sense of force; as, for instance, in the statement, "A train, weighing 100 tons moving against a resistance of 20 pounds a ton, is drawn by an engine exerting a pull of 2 tons, &c."

But when the practical man opens the ordinary text-book on dynamics, then the confusion begins. Take, for instance, the familiar equation $W = Mg$: what does it mean? The writers tell us that W means the weight and M the mass of the body. Having defined "weight" as the force with which the body is attracted by the earth, the writer implies that he is keeping to the statical gravitational unit of force, and therefore his unit of mass is the mass of g pounds, if W, the weight, is measured in pounds. But, after defining a pound as a unit of mass, he ought to take M as the weight in pounds, and then the equation $W = Mg$ means that the earth attracts M pounds with a force of W poundals where $W = Mg$.

The confusion is intolerable ("most tolerable, and not to be endured"), and entirely due to the erroneous mathematical definition of the word "weight," combined with straining the units of mass and force so as to fit into the equation $P = Mf$, when absolute units are not employed.

To show the absurdity of the definition that "the weight of a body is the force with which it is attracted by the earth," take the question, "What is the weight of the earth?" Accord-

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